

DRAFT

Ms. Allison Boucher
Friends of the Tuolumne, Inc.
2412 Hilo Lane
Ceres, CA 95307

Dear Ms. Boucher:

I am writing in support of the Bobcat Flat Instream Restoration 2 River Mile 44 Channel Restoration Project.

The San Joaquin River Management Program provides a forum to identify problems and solutions to issues related to wildlife, flood protection, water quality, water supply, fisheries, and recreation. The SJRMP Action Team and Advisory Council have reviewed and discussed this project and support the effort to restore the floodplain and improve spawning and rearing conditions for chinook salmon and steelhead trout in the Tuolumne River.

The Advisory Council is in support of the project proposed by Friends of the Tuolumne and understands that restoring the floodplain will increase flood protection and by improving the channel and gravel quality will result in increased survival of salmonid eggs and juveniles.

The 1995 San Joaquin River Management Plan recommends projects related to flood protection and channel and spawning gravel work (see p. 22). This recommendation is based upon improving and restoring areas previously mined for gold and gravel. In combination with flow and channel improvements, these projects can increase adult salmon populations.

If you have any questions in this regard, please call Paula Landis at (559) 230-3310.

Sincerely,

Timothy Ramirez, Chair
San Joaquin River Management Program
Advisory Council

**SUPPORTING
DOCUMENTATION
IS ON THE
FOLLOWING PAGES**

Bobcat Flat Instream Restoration 2 River Mile 44 Channel Restoration Project

**Friends of the Tuolumne, Inc.
September 2001**

CALFED recently granted funding to the Friends of the Tuolumne to acquire approximately 300 acres of riparian floodplain, known as Bobcat Flat. Located at river mile 44 on the Tuolumne River, Bobcat Flat is in the Dredger Tailing Reach, 12 miles east of Waterford and 8 miles downstream of La Grange Dam.

This is a instream channel restoration project focused on increasing spawning habitat for Chinook salmon and steelhead trout. The terraced floodplain will be lowered and planted with native woody plants increasing naturally self-sustaining habitat for birds and mammals.

The proposed restoration project would reverse impacts of dredge mining and return the river to a complex single thread channel with a more gentle lowflow slope. The restoration would also lower the terraced floodplain allowing seasonal flooding. The restoration will use gravel located on site to fill one dredger mining slough and the right split-channel on the upper segment. The middle section of channel may be located north of the existing channel to increase channel length, reduce gradient, and increase sinuosity and complexity. This will create a natural pool-riffle morphology.

This project will test the hypothesis that additional spawning habitat downstream from La Grange will attract increased spawning, especially in years of good escapement, helping to reduce superimposition at the upstream spawning riffles. It will also test the hypothesis that a spawning riffle can be designed that is suitable for spawning of both steelhead trout and Chinook salmon in the Tuolumne River. We will be testing the hypothesis that a riparian habitat that is low enough to flood seasonally will be self-sustaining in the dredger tailings cobble.

This project addresses San Joaquin Region priorities of continuing habitat restoration actions in collaboration with local groups; restoring geomorphic processes in stream and riparian corridors; improving rearing and spawning habitat for Chinook salmon and steelhead trout; and improving understanding of at-risk species.

Contact: Dave or Allison Boucher; (209) 537-7533; dboucher@netfeed.com.

River Mile 44 Channel Restoration Project
Description of Proposed Approach and Expected Costs

Submitted on behalf of the Friends of the Tuolumne, Inc.

2412 Hilo Lane
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June 25, 2000

Introduction. The Tuolumne River and its floodplain have a history of modifications that have affected geomorphic and ecological conditions and processes in the river and have contributed to the decline of the river's chinook salmon population. Major modifications to the river have included flow regulation and diversion, gold and aggregate mining, and land use conversion. Despite these extensive impacts, the Tuolumne River still supports the largest population of chinook salmon in the San Joaquin River Basin.

Several ongoing and planned restoration projects are underway on the Tuolumne River, primarily to meet objectives set forth in the 1995 FERC Settlement Agreement to relicense the Don Pedro Project, as well as to meet target salmon production goals established by the Anadromous Fish Restoration Program (AFRP). Despite these efforts, a large stretch of river referred to as the Dredger Reach (approximately 5 miles) has received relatively less attention, and remains severely degraded. The *Habitat Restoration Plan for the Lower Tuolumne River Corridor* (McBain and Trush 2000) identified the Dredger Reach as a high priority area for restoration. If restored, this reach could provide extremely productive chinook salmon spawning and rearing grounds, and thus help attain target population levels as well as improve channel and floodplain conditions.

CALFED recently granted funding to the Friends of the Tuolumne (FOTT) to acquire approximately 300 acres of riparian floodplain on the Tuolumne River from river mile 42.7 to 44.3 (approximately 1.6 miles of riverfront property). This property, located 12 miles east of Waterford and 8 miles downstream of La Grange Dam, is within the Dredger Tailing Reach. Included in the land acquisition was approximately 100,00 cubic yards of valuable dredger tailings that are an essential ingredient for restoration in this reach. The estimated cost to restore channel morphology and improve salmon habitat conditions is \$1,800,000.

Background. The upper reaches of the Tuolumne River below La Grange Dam were severely degraded by gold dredgers in the mid-1900's as the river bottomlands were turned upside down in search for gold. The dredging operation left behind large rows of gravel piles with deep depressions in between. Much of the dredger tailings were removed in the late 1960's and used to construct the New Don Pedro project. Following removal of the tailings, Davis-Grunsky Act funds were used in the early 1970's to begin reconstructing a defined channel through the chaos of multiple channels left by the gold dredgers and subsequent dredger tailing reclamation. Unfortunately, only the reach upstream of Basso Bridge (RM 47.5) was completed, leaving the Dredger Reach severely damaged.

In general, dredge mining converted the natural pool-riffle channel morphology to a "lake-cascade" morphology. This conversion removed the natural sequence of low-gradient riffles that provided high quality salmon spawning and rearing habitat, and replaced them with much fewer high-gradient riffles separated by long backwater pools (Figure 1). Many of these high gradient riffles

have water surface slopes greater than 1% during spawning flows (<300 cfs), and thus create higher water velocities than are preferred by spawning salmon. Not only are habitat conditions within riffles less suitable, but the total surface area of riffles was also reduced (Figure 1). In the Dredger Reach, the density of riffle surface area is only about one-third of the riffle area in the spawning reach upstream of Basso Bridge, and average “high” redd counts are consequently much lower (Table 1).

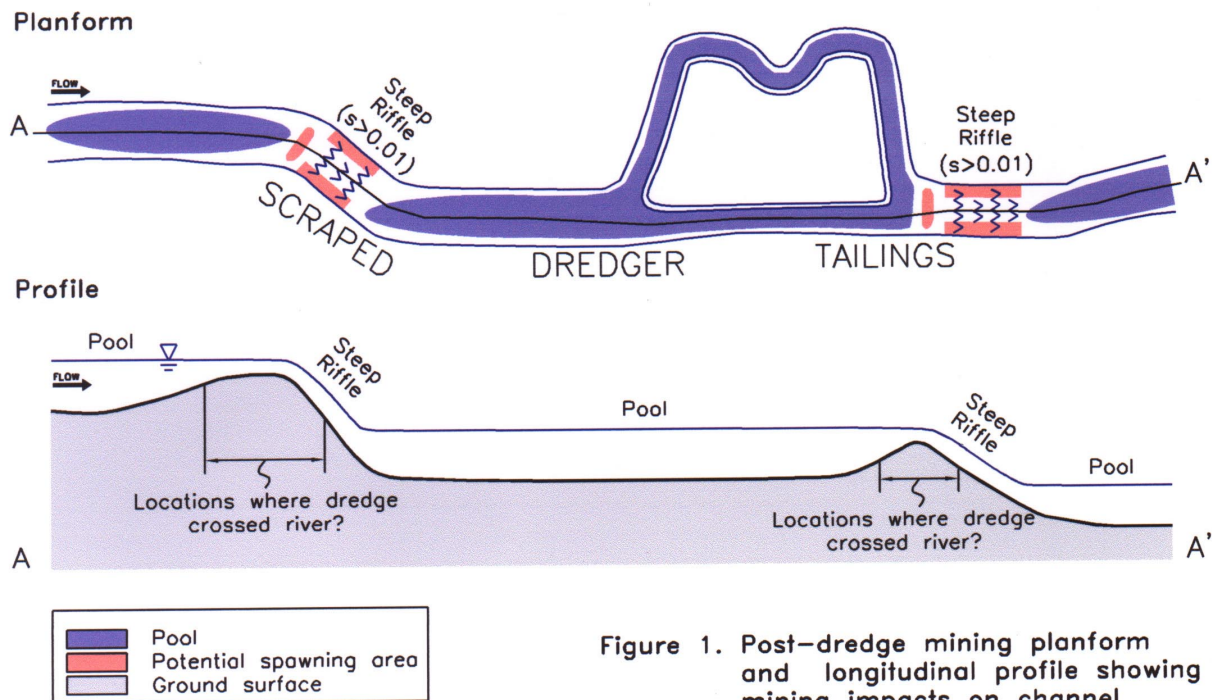


Figure 1. Post-dredge mining planform and longitudinal profile showing mining impacts on channel

The severely altered morphologic conditions left by the dredge mining are additionally compounded by flow and sediment regulation from the upstream dams, which has essentially prevented the channel from recovering a more natural channel morphology. Within these current physical constraints, the Dredger Reach cannot recover natural channel and floodplain features and habitats without some initial mechanical intervention. Because of its strategic location in the upper gravel-bedded zone, however, this reach offers extraordinary potential to restore physical processes, associated habitats, and dramatically increase the salmon production potential from the Tuolumne River. Restoring a more natural distribution of slope and channel morphology throughout the entire reach would greatly increase the quantity and quality of spawning habitat, and improve fry and juvenile rearing habitat.

Reach	River mile	Riffle area (ft²)	<u>Riffle area density (ft²/mi)</u>	<u>Average “high” redd counts (1981-1995)</u>
LaGrange Dam Reach	50.5 – 52.1 (1.6 miles)	68,000 ^a	42,400	875 ^b
Basso Spawning Reach	46.8 – 50.5 (3.7 miles)	767,000 ^a	207,000	5,600 ^b
Dredger Mining Reach	41.8 – 46.8 (5.0 miles)	326,000 ^a	65,000	3,000 ^b
Gravel Mining Reach	33.9 – 41.8 (7.9 miles)	699,000 ^a	89,000	2,800 ^b
In-channel Gravel Mining Reach	46.8 – 50.5 (7.9 miles)	821,000 ^a	104,000	900 ^b
Bobcat Flat Site	42.7 - 44.3 (1.6 miles)	56,000 ^a	35,000	160 ^b

^a Data summarized from EA Engineering, Science, and Technology (1992).

^b Based on CDFG annual redd counts from 1981-1995. “High” redd counts refer to the highest redd count for numerous redd surveys conducted during each year, and the value shown in the table above is the average of these “high” redd counts from 1981-1995.

Table 1. Comparison of spawning riffle areas between the Basso Spawning Reach (desirable) and Bobcat Flat (undesirable “lake-cascade” morphology within Dredger Tailing Reach).

Restoration Approach. Reversing the impacts of the dredge mining will require conversion from the “lake-cascade” morphology back to a more natural pool-riffle morphology. This can only be accomplished by redistributing the elevation drop in the short, steep riffles to re-create low gradient riffles with a slope less than 0.2%. This redistribution of slope will not only improve the hydraulic conditions (water velocities) within each riffle to increase spawning habitat, but it will also greatly increase the total amount of potential spawning habitat by increasing the riffle surface area.

The proposed restoration area lies on the eastern edge of the Bobcat Flat parcel, from RM 44.2 to 44.7 (Figure 2). Recent spawning habitat mapping and redd surveys has shown that the upstream portion of this reach consists of a short, disjointed, split-channel that very little salmon spawning habitat. There are several off-channel ponds and shallow backwater areas adjacent to the channel that may serve as refuge for warm water predator species. The middle segment of the reach is a straight, steep riffle-run sequence that is severely encroached and channelized by riparian vegetation. Below this straight reach, the channel then makes a steep, 90° left-bend, that ends in a large pool and left-bank backwater. Salmon habitat in the lower portions of the reach is also very poor quality.

The proposed restoration project would remove portions of encroached vegetation, reduce the elevation of selected terrace surfaces to generate fill material and create floodplains, and re-create a gently meandering channel. The right split-channel in the upper segment would be filled to re-create floodplain and concentrate flow into a complex single-thread channel. The middle section of channel may be relocated into the slough to the north of the existing channel to increase channel length, reduce slope, and increase sinuosity and complexity. The sharp left-bend at the lower end of the reach would be straightened slightly to achieve a more gentle meander bend. This restoration approach would achieve a longer channel length, more riffle surface area, and gentle lowflow slope. The relocated channel would rejoin the existing channel at the upstream end of the 90° bend. Several backwater and off-channel pond areas would be filled to reduce the potential for juvenile salmon stranding.

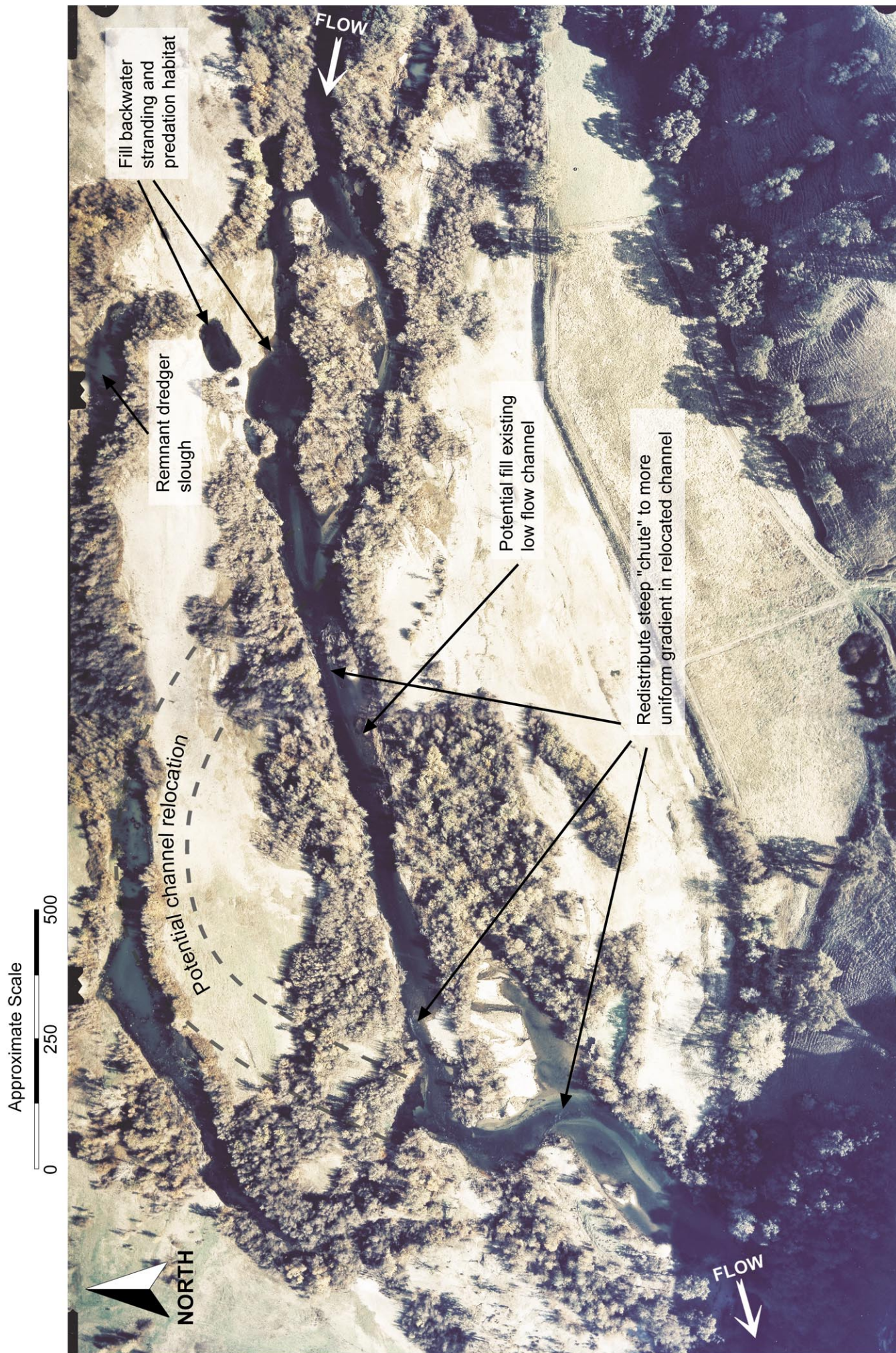


Figure 2. Proposed dredger reach restoration site from RM 44.2 to 44.7

Overall project objectives include:

- Rebuild a natural channel morphology scaled to the current flow regime that converts short and steep riffles into a more natural and low gradient pool-riffle morphology;
- Ensure the floodway will convey floods of at least 15,000 cfs, consistent with the goals in the Restoration Plan;
- Increase salmon spawning and rearing habitat quantity and quality by restoring an alternate bar (pool-riffle) morphology, and by introducing clean spawning gravels within the channel;
- Eliminate salmon stranding and predation problems associated with backwaters and sloughs, and in floodplain “traps” accessed during moderate flows;

Anticipated Benefits and Costs. Anticipated benefits will be dependent on the amount of additional spawning habitat created. The degree of benefit will depend on each year’s escapement. The project will provide a much greater benefit during years with high escapement as spawner density (and associated superimposition losses) in the Basso Reach is reduced by redistributing spawning into the Bobcat Flat restoration site. As shown in Figure 3, spawning is presently concentrated in the Basso Reach because it has a more natural channel morphology and therefore higher quality spawning habitat. Implementing restoration in the Dredger Reach RM44 will restore the channel to a more natural morphology, similar to the Basso Reach. This should allow more spawning in the Tuolumne River, particularly during high escapement years.

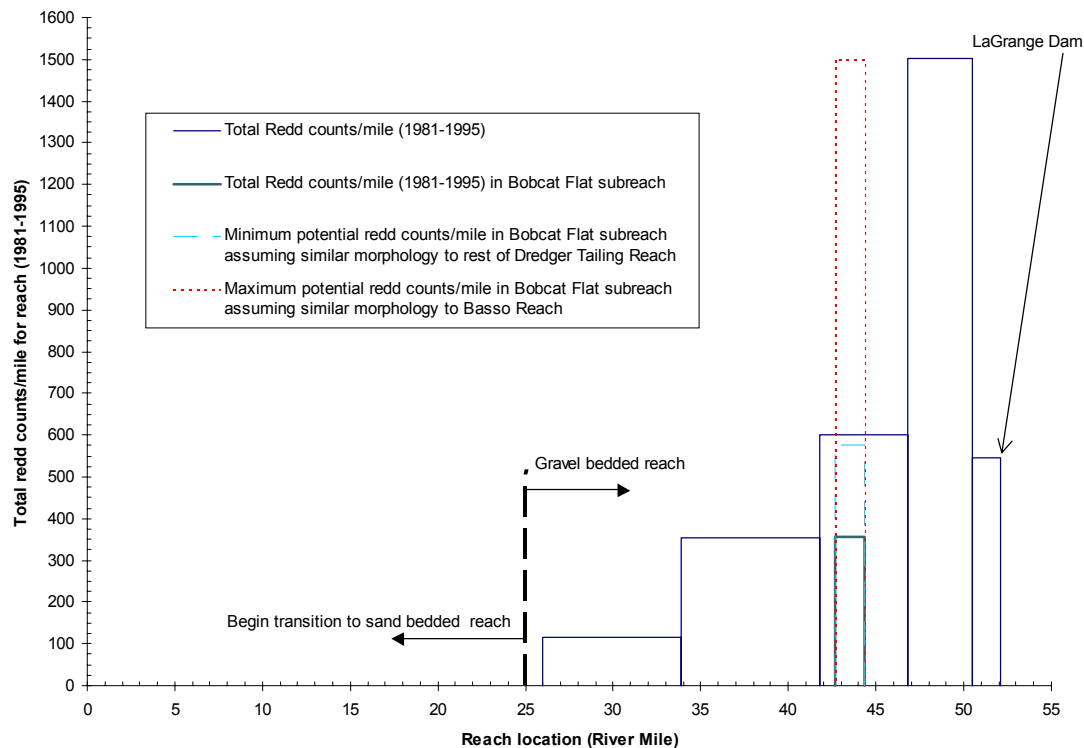


Figure 3. Average number of high redd counts for the upstream portion of the gravel bedded reach, showing potential long-term improvements in spawning use in the Bobcat Flat reach as channel morphology and spawning habitat is improved.

Anticipated costs are summarized in Table 2.

Table 2. Estimated costs for implementing Dredger Reach RM 44 restoration project.

Task	Cost
Project Management	\$60,000
Hydraulic modeling, Permitting, Environmental documentation	\$70,000
Survey, Design, and Bid documents	\$150,000
Construction Implementation	\$750,000
Revegetation	\$225,000
Construction Management (8% of Construction and Reveg Costs)	\$80,000
Monitoring and Reporting	\$205,000
Contingency (20%)	\$310,000
TOTAL BUDGET ESTIMATE:	\$1,850,000

References

McBain & Trush. 2000. Habitat Restoration Plan for the Lower Tuolumne River Corridor, Prepared for Tuolumne River Technical Advisory Committee (Don Pedro Project, FERC License No. 2299) Stanislaus County, California.